

CLAIMS:

1. A slurry spraying or installation system including a gun means, a spray nozzle and a conduit connecting said gun means to said spray nozzle, said gun means including a pump means to move dry particulate towards said nozzle along said conduit, wherein between said gun means and said nozzle is a mixing device which receives said dry particulate and mixes same with liquid under a greater pressure than the pressure that said dry particulate is under, so as to form a liquid and dry particulate mixture; said mixture being fed to said nozzle for dispensing to a target.
2. A system as claimed in claim 1, wherein said mixing device includes an expansion chamber having a diverging passage which diverges in the direction of flow of said dry particulate.
3. A system as claimed in claim 2, wherein said mixing device includes, downstream of said diverging passage, a transition passage.
4. A system as claimed in claim 3, wherein at least one of said diverging passage or said transition passage, or between these passages, there is included a liquid inlet.
5. A system as claimed in claim 4, wherein said liquid inlet includes a liquid inlet nozzle which projects liquid at an angle to the direction of flow of said dry particulate through said mixing device.
6. A system as claimed in claim 4, wherein said liquid inlet nozzle can be at an angle of between 40° and 80° from the direction of flow.
7. A system as claimed in claim 5 or 6, wherein said nozzle is aligned so that a central longitudinal axis thereof intersects a central longitudinal axis of said mixing device.
8. A system as claimed in claim 5 or 6, wherein said nozzle is aligned so that a central longitudinal axis thereof is skewed relative to a central longitudinal axis of said mixing device.
9. A system as claimed in any one of the preceding claims where said mixing device includes a converging passage downstream of said transition passage.
10. A system as claimed in any one of the preceding claims, wherein an inlet to the diverging passage is of a larger cross sectional area than the cross sectional area of the end of a conduit delivering said dry particulate from said gun means to said mixing device.

11. A system as claimed in any one of claims 1 to 10, wherein said inlet to the diverging passage has a diameter in the range from 5% to 200% larger than the internal diameter of a conduit delivering dry particulate to said diverging passage.
12. A system as claimed in claim 10 or 11, wherein said conduit has an internal diameter of approximately 38mm and said inlet diameter of said diverging passage is in the range of 40 to 60mm and possibly up to 80mm.
13. A system as claimed in any one of the preceding claims, wherein the inside diameter of said diverging passage at the end of said passage is of the order of 55 mm to 80 mm.
14. A system as claimed in any one of the preceding claims, wherein a preferred set of dimensions for the diverging passage includes: the inlet is 50mm and the end of the passage expands out to 65mm for a 38mm inside diameter conduit delivering dry particulate to said diverging passage.
15. A system as claimed in any one of the preceding claims, wherein said diverging passage can be of a length which varies from 150mm to 900mm.
16. A system as claimed in any one of the preceding claims, wherein said transition passage can have the same cross sectional area or internal diameter as the outlet end of the diverging passage.
17. A system as claimed in claim 16, wherein said transition passage extends for a distance of between 100mm and 300 mm.
18. A system as claimed in claim 16 or 17, wherein said transition passage has a substantially constant cross section.
19. A system as claimed in claim 16 or 17, wherein said transition passage has a converging shape.
20. A system as claimed in any one of the preceding claims, wherein said converging passage and or said transition passage terminates in an outlet passage of substantially constant cross section.
21. A system as claimed in claim 20, wherein said outlet of said converging passage has a cross sectional area which is approximately equal to the cross sectional area of the passage in a conduit to be connected to said outlet.
22. A system as claimed in claim 20 or 21, wherein said converging passage has its largest diameter in the order of 60mm to 80mm and it tapers down to 38mm at its outlet diameter.

23. A system as claimed in claim 22, wherein the length of the taper can vary between 350mm and 1500mm, but preferably between 600mm to 800mm and most preferably around 720mm.
24. A system as claimed in claim 20, wherein said outlet passage of said converging passage which is of substantially constant cross section can extend for between 80mm and 200mm and more preferably 120mm.
25. A system as claimed in any one of the preceding claims, wherein the liquid inlet can be a liquid ring.
26. A system as claimed in any one of the preceding claims, wherein when the gun means, the nozzle during use, and the mixing device are within a height differential of between up to 1 metre to 2 metres of each other, the mixing device is located along a conduit length of no more than 90 metres from the nozzle.
27. A system as claimed in any one of the preceding claims, wherein said mixing device is in the range of 5 m to 15 m of conduit length from the gun means.
28. A system as claimed in any one of the preceding claims, wherein said gun means preferably applies a pressure of between 100kpa and 600kpa to the dry particulate.
29. A system as claimed in any one of the preceding claims, wherein said liquid inlet to the mixing device has its own supply and pressure source.
30. A system as claimed in claim 29, wherein said pressure source can supply liquid to the liquid inlet at approximately 1000 kPa.
31. A system as claimed in claim 29, wherein the pressure source can supply enough pressure to provide a pressure differential between the liquid inlet pressure and the dry particulate pressure of the order of 200 kPa to 900 kPa.
32. A system as claimed in any one of the preceding claims, wherein the liquid inlet nozzle propels liquid in a spray having a spray angle in the order of 70° to 120° with a flow rate of between 0.1 US gallon per minute to 0.4 US gallons per minute.
33. A system as claimed in any one of the preceding claims, wherein the system develops a pressure of the order of 100 kPa to 200 kPa, when measured in the conduit feeding the nozzle, at a location approximately 1 metre to 2 metres back from the nozzle.
34. A system as claimed in any one of the preceding claims, wherein said system includes the ability to add liquid to the preform slurry at said nozzle prior to ejection or emission from said nozzle.

35. A mixing device to preform a settable slurry, said device including an inlet having a larger internal cross sectional area than a hose connected to said device to deliver to said device a dry particulate under pressure to be preformed into said slurry, a diverging passage extending from said inlet and a transition passage located downstream of said diverging passage, said transition passage having a substantially constant cross section, and a liquid inlet being located in one said diverging passage or said transition passage.
36. A mixing device as claimed in claim 35, wherein said mixing device is formed from liners which respectively include the diverging passage, transition passage and converging passage.
37. A mixing device as claimed in any one of claims 35 or 36, wherein said inlet end of the diverging passage has a flange or other fitting to allow said inlet end to connect to a hose by a coupling device.
38. A mixing device as claimed in any one of claims 35 to 37, wherein there is included a converging passage whereby the outlet end of the converging passage has a flange or other fitting to allow connection to a conduit by a coupling device.
39. A mixing device as claimed in any one of claims 35 to 38, wherein said transition passage is of a substantially constant cross section.
40. A mixing device as claimed in any one of claims 35 to 38 wherein said transition passage is of a converging shape.